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**An Objective Verification of the North American Mesoscale Model for
Kennedy Space Center and Cape Canaveral Air Force Station**

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The 45th Weather Squadron (45 WS) Launch Weather Officers use the 12-km resolution North American Mesoscale (NAM) model (MesoNAM) text and graphical product forecasts extensively to support launch weather operations. However, the actual performance of the model at Kennedy Space Center (KSC) and Cape Canaveral Air Force Station (CCAFS) has not been measured objectively. In order to have tangible evidence of model performance, the 45 WS tasked the Applied Meteorology Unit to conduct a detailed statistical analysis of model output compared to observed values. The model products are provided to the 45 WS by ACTA, Inc. and include hourly forecasts from 0 to 84 hours based on model initialization times of 00, 06, 12 and 18 UTC. The objective analysis compared the MesoNAM forecast winds, temperature and dew point, as well as the changes in these parameters over time, to the observed values from the sensors in the KSC/CCAFS wind tower network. Objective statistics give the forecasters knowledge of the model's strength and weaknesses, which will result in improved forecasts for operations.

The data sets were stratified by 45°, 90°, 180° and all direction wind sectors as well as by year, warm season (May-Sep), cool season (Oct-Apr), month and model initialization time. Also, the sector directions were oriented to maximize discrimination between on-shore/off-shore flow for each wind tower. The model forecasts were analyzed only for the current operational version of the MesoNAM using the following statistics:

- Bias (mean difference)
- Standard deviation of Bias
- Hypothesis test for Bias = 0
- Root Mean Square Error (RMSE)
- Standard deviation of RMSE
- Hypothesis test for RMSE = 0
- Hypothesis tests to determine if the Bias and RMSE at the same levels of different towers are the same, and
- Hypothesis test to determine if composited Bias and RMSE = 0.

Details of how the MesoNAM performed under the various stratifications at KSC and CCAFS will be presented.

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
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1. REPORT DATE (DD-MM-YYYY) 03-08-2009		2. REPORT TYPE Abstract		3. DATES COVERED (From - To) May 2009-August 2009	
4. TITLE AND SUBTITLE An Objective Verification of the North American Mesoscale Model for Kennedy Space Center and Cape Canaveral Air Force Station				5a. CONTRACT NUMBER NNK06MA70C	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) William H. Bauman III				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) ENSCO, Inc. 1980 N. Atlantic Ave Suite 830 Cocoa Beach, FL 32931				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) NASA John F. Kennedy Space Center Code KT-C-H Kennedy Space Center, FL 32899				10. SPONSORING/MONITOR'S ACRONYM(S)	
				11. SPONSORING/MONITORING REPORT NUMBER	
12. DISTRIBUTION/AVAILABILITY STATEMENT Unclassified, Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT The 45th Weather Squadron (45 WS) Launch Weather Officers use the 12-km resolution North American Mesoscale (NAM) model (MesoNAM) text and graphical product forecasts extensively to support launch weather operations. However, the actual performance of the model at Kennedy Space Center (KSC) and Cape Canaveral Air Force Station (CCAFS) has not been measured objectively. In order to have tangible evidence of model performance, the 45 WS tasked the Applied Meteorology Unit to conduct a detailed statistical analysis of model output compared to observed values. The model products are provided to the 45 WS by ACTA, Inc. and include hourly forecasts from 0 to 84 hours based on model initialization times of 00, 06, 12 and 18 UTC. The objective analysis compared the MesoNAM forecast winds, temperature and dew point, as well as the changes in these parameters over time, to the observed values from the sensors in the KSC/CCAFS wind tower network. Objective statistics will give the forecasters knowledge of the model's strength and weaknesses, which will result in improved forecasts for operations.					
15. SUBJECT TERMS Numerical Weather Prediction, Weather Modeling, Statistics, Space Shuttle, Weather, Meteorology					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Dr. Francis J. Merceret
	UU	UU	UU	1	19b. TELEPHONE NUMBER (Include area code) (321) 867-0818